

Exercise questions

In this exercise, you will study the network structre underlying the same synthethic social media data that has been analysed in the previous exercises.

Complete this exercise only after you have successfully completed the first exercise where you have implemented the code analysing the social media data.

Note that you can submit the answer to each question only once.

Points 5 / 5

My submissions 1 / 1

Deadline Friday, 31 March 2023, 19:00

To be submitted alone

The deadline for the assignment has passed (Wednesday, 12 April 2023, 19:00).

Clustering coefficient, value and meaning

Question 1 5 points

What is the clustering coefficient value and how do you interpret it?

- ☒ The value is around 0.01, and it means that for an average node around 1% pairs of its neighbors are connected.
- ☐ The value is around 0.01, and it means that 1% of all nodes belong to a cluster in the network.
- ☐ The value is around 0.23, and it means that for an average node around 23% pairs of its neighbors are connected.
- ☐ The value is around 0.23, and it means that 23% of all nodes belong to a cluster in the network.

Submit

Points 0 / 5

My submissions 1 / 1

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Clustering coefficient, interpretation

Question 1 0 / 5

What is the most correct interpretation of the clustering coefficient value?

- ☐ The clustering coefficient is small compared to typical social networks (e.g., friendship networks, face-to-face meetings). This means that the network might have not been produced with typical social network mechanisms such as triadic closure.
- ☒ The clustering coefficient is small compared to typical social networks (e.g., friendship networks, face-to-face meetings). This means that the neighborhoods of average nodes in the network are small compared to typical social networks.
- ☐ The clustering coefficient is of roughly equals value compared to typical social networks (e.g., friendship networks, face-to-face meetings). This means that the network could be produced with typical social network mechanisms such as triadic closure.
- ☐ The clustering coefficient is of roughly equals value compared to typical social networks (e.g., friendship networks, face-to-face meetings). This means that the network could be produced with typical social network mechanisms such as triadic closure. This means that the neighborhoods of average nodes in the network are of roughly normal size as compared to typical social networks.

Incorrect

Submit

Points 5 / 5

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Network figure

Question 1 5 points

What is the most correct interpretation of the network figure that is produced by the code?

- ☐ The network seems to have a large number of communities that are only linked to each other by few links.
- ☐ The network seems to have two very distinct communities that are only linked to each other by few links.
- ☒ The network seems to have core-periphery structure where there is one dense core group and one periphery group with few connections.

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Points 5 / 5

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Community detection

Question 1 5 / 5

The template code contains function calls for two community detection methods. Run both of them multiple times. What are your observations?

- ☒ Both of the community detection methods seem to produce almost the same result most of the times: they find the two clusters that one can observe visually from the layout of the network. While this is unusual for community detection methods, it is likely because the communities in this network are so distinct.
- ☐ The community detection methods produce completely different results every time they are run, even though the code is exactly the same. This suggests that the methods are not reliable.
- ☐ The community detection methods produce different results every time they are run, with no clear pattern. This suggests that the network structure is too complex for the methods to accurately capture the community structure.

Correct!

Submit

Points 10 / 10

My submissions 1 / 1

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Community detection, content

Question 1 10 / 10

Find the 10 most common hashtags in the two communities based on the communities you find using the Kernighan-Lin bisection method. Looking at the hashtags what is the observation you can make?

- ☒ The hastags clearly show that one of the groups consists of sceptics and the other one consist of activists: The sceptics have hastags such as #climatechangehoax, #climatefiction, and #climatefraud that don't appear in the activists groups top hashtags. Similarly, the activist group has hashtags such as #fridays4future and #schoolstrike4climate that don't appear in the sceptics group.
- ☐ The hastags clearly show that one of the groups consists of people talking about the IPCC panel and the other one consist of general discussions: The IPCC panel group has hastags such as #ipcc and #climatoreport that don't appear in the general discussion groups top hashtags. Similarly, the general discussion group has hashtags such as #climatechange that don't appear in the IPCC group.
- ☐ The hastags clearly show that one of the groups consists of people talking about the SRCLL report and the other one consist of general discussions: The SRCLL panel group has hashtags such as #SRCLL2024 and #climatoreport that don't appear in the general discussion groups top hashtags. Similarly, the general discussion group has hashtags such as #climatechange that don't appear in the SRCLL group.
- ☐ None of the above options is true, and the two groups have very similar hastags. Overall in social networks the content and the structure are often independent of each other, and that is why it is important to perform both content analysis and structural social network analysis for data that have both information.

Correct!

Submit

Points 10 / 10

My submissions 1 / 1

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Degree distribution

Question 1 10 / 10

What best describes the degree distribution of the network:

- ☐ All the nodes have degrees very close to the average degree and the degree distribution is an exponential distribution. This means that most users have a very similar amount of connections and there are no hubs in this network. The degree distribution shows as a straight line in a plot where the y-axis is logarithmic.
- ☐ The degree distribution is a power-law, which shows as a straight line in the log-log scale plot. This means that the network is scale-free.
- ☒ While most nodes have degree close to the average degree, there are some hubs with significantly larger degree than the average degree. However, the network is not scale-free, because the degree distribution does not show as straight line in the log-log scale plot.

Correct!

Submit

Points 10 / 10

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Recommendation engine bias, degree

Question 1 10 / 10

Does your recommendation engine give biased recommendations with regards to the degrees of the users? What consequences does this have?

- ☐ On average, the engine recommends nodes with degree lower than the average degree of the network. This means that the differences in degrees will eventually even out if the recommendations are followed.
- ☐ There is no bias with regards of the degree. If the recommendations are followed this means that the degrees will eventually follow a Poisson distribution where large deviations from the mean are very unlikely.
- ☒ On average, the engine recommends nodes with degree higher than the average degree of the network. This means that the recommendation engine contributes to the large differences between degrees, and possibly helps the hubs to become even more popular.

Correct!

Submit

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Recommendation engine bias, communities

Question 1 10 / 10

Does your recommendation engine give biased recommendations with regards to the communities of the users? What consequences does this have?

- ☐ On average, the engine recommends more connections between users from different communities than one would expect from completely random recommendations. If these recommendations are followed, the community structure of the network is rapidly disbanded and there will only be a single community.
- ☐ There is no bias with regards of the community structure. Following recommendations would eventually disband the community, but some other mechanisms such as people connecting to other with similar political stance would still keep the groups separate.
- ☒ On average, the engine recommends more connections between users within communities than one would expect from completely random recommendations. The recommendation engine can play a role on creating communities that are largely disconnected from each other, especially when combined with other mechanisms such as people connecting to other with similar political stances.

Correct!

Submit